

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended) ~~A method for monitoring~~

Monitoring the quality of a weld being formed between first and second pieces of material, the method monitoring
comprising the steps of:

positioning the first and second pieces to abut each other;

heating the first and second pieces at their location of abutment to form a pool of material at the location of abutment which pool of material forms a weld between the pieces;

simultaneous with said heating step, obtaining a thermal image of the weld as the weld is being formed by collecting infrared radiation passing through the second piece of material from the weld and the pool of material; and

analyzing the obtained thermal image for characteristics indicative of a properly formed an acceptable weld being formed.

Claim 2 (Original) The method of claim 1 wherein the step of obtaining a thermal image of the weld being formed further includes the step of:

obtaining a thermal image that includes, in its entirety, a weld pool that results in the weld.

Claim 3 (Original) The method of claim 2 wherein the step of obtaining a thermal image that includes the weld pool in its entirety further includes the step of:

positioning an infrared detector that is configured to detect infrared radiation having a wavelength that passes through the second piece of material on a side of the second piece of material opposite the first piece of material and in a location in which the weld pool in its entirety is within a field of view of the infrared detector.

Claim 4 (Original) The method of claim 2 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a temperature of each portion of the weld pool; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range.

Claim 5 (Original) The method of claim 4 wherein the step of comparing the determined temperature of each portion of the weld pool with a threshold temperature range further includes the steps of:

determining a time at which the thermal image was obtained; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range that is associated with the determined time to determine whether the

determined temperatures are within the associated threshold temperature range.

Claim 6 (Original) The method of claim 5 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined temperature is outside of the associated threshold temperature range.

Claim 7 (Original) The method of claim 2 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a width of the weld pool at all locations along a path of the weld pool; and

comparing the determined widths to a threshold width range to determine whether the determined widths are within the threshold width range.

Claim 8 (Original) The method of claim 7 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined width is outside of the threshold width range.

Claim 9 (Original) The method of claim 2 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the step of:

analyzing the weld pool in its entirety for indications of a void in the weld pool.

Claim 10 (Original) The method of claim 9 further including the step of:

providing a feedback signal to a weld controller in response to determining that a void exists in the weld pool.

Claim 11 (Original) The method of claim 1 further including the step of:

providing a feedback signal to a weld controller in response to determining that a characteristic fails to meet an associated criterion.

Claim 12 (Original) The method of claim 1 further including the step of:

providing an alarm signal to an alarm device in response to determining that a characteristic fails to meet an associated criterion.

Claim 13 (Currently Amended) ~~A method for monitoring~~
Monitoring the quality of a weld being formed between first
and second pieces of material, the method monitoring
comprising the steps of:

positioning the first and second plastic pieces to abut
each other;

heating the first and second plastic pieces at their
location of abutment to form a pool of material at their

location of abutment which pool of material forms a weld between the pieces;

determining a range of wavelengths of infrared radiation that will pass through the second piece of material;

positioning an infrared detector that is configured to detect infrared radiation within the determined range of wavelengths on a side of the second piece of material opposite the first piece of material;

simultaneous with said heating step, obtaining a thermal image of the weld as the weld is being formed between the first and second pieces of material by collecting infrared radiation within the determined range of wavelengths from the weld and the pool of material; and

analyzing the obtained thermal image for characteristics indicative of a properly formed an acceptable weld being formed.

Claim 14 (Original) The method of claim 13 wherein the step of obtaining a thermal image of the weld being formed further includes the step of:

obtaining a thermal image that includes, in its entirety, a weld pool that results in the weld.

Claim 15 (Original) The method of claim 14 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a temperature of each portion of the weld pool; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range.

Claim 16 (Original) The method of claim 15 wherein the step of comparing the determined temperature of each portion of the weld pool with a threshold temperature range further includes the steps of:

determining a time at which the thermal image was obtained; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range that is associated with the determined time to determine whether the determined temperatures are within the associated threshold temperature range.

Claim 17 (Original) The method of claim 16 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined temperature is outside of the associated threshold temperature range.

Claim 18 (Original) The method of claim 14 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a width of the weld pool at all locations along a path of the weld pool; and

comparing the determined widths to a threshold width range to determine whether the determined widths are within the threshold width range.

Claim 19 (Original) The method of claim 18 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined width is outside of the threshold width range.

Claim 20 (Original) The method of claim 14 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the step of:

analyzing the weld pool in its entirety for indications of a void in the weld pool.

Claim 21 (Original) The method of claim 20 further including the step of:

providing a feedback signal to a weld controller in response to determining that a void exists in the weld pool.

Claim 22 (Original) The method of claim 13 further including the step of:

providing a feedback signal to a weld controller in response to determining that a characteristic fails to meet an associated criterion.

Claim 23 (Original) The method of claim 13 further including the step of:

providing an alarm signal to an alarm device in response to determining that a characteristic fails to meet an associated criterion.

Claim 24 (New) The method of claim 13 wherein the step of obtaining the thermal image of the weld being formed includes the step of filtering the infrared radiation to block out the electromagnetic energy having a first wavelength that is used in heating the first and second pieces at their location of abutment to form a pool of material and a weld between the first and second pieces.